

Heterotopic ossification on the elbow in a hemiplegic patient: A case report

Heterotopic ossification occurred on the paralysed arm

Elif Balevi Batur
Dr.Arazi Medical Center, Konya, Turkey

Abstract

Heterotopic ossification (HO) is characterized by a lamellar new bone formation particularly developing between muscle and joint capsule. HO mostly occurs on and around the hip joint. Shoulder and elbow are the other common-affected joints. There are three well-known etiologies of HO as of traumatic, neurogenic, and genetic. But, HO is a rare clinic entity in hemiplegic patients. HO is a condition that affects the patient's mobility, self-care, and independence. In hemiplegic patients, especially in case of joint-related pain, local tenderness, increased temperature, and swelling HO should be considered in the differential diagnosis. The treatment options of HO are preserving the affected joint's range of motion, pharmacological treatment (etidronate, nonsteroid anti-inflammatory drugs), radiotherapy, and surgical excision of the mature bone tissue in the advanced cases. This report presents a case with HO developed on the left elbow 2 months after the stroke due to a hemorrhagic cerebrovascular event.

Keywords

Heterotopic Ossification; Stroke; Elbow

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Corresponding Author: Elif Balevi Batur, Dr.Arazi Medical Center, 42060, Konya, Turkey.
GSM: +905386440903 F.: +90 3323538731 E-Mail: elifbalevi@hotmail.com
ORCID ID: 0000-0001-8886-1144

Introduction

Heterotopic ossification (HO) is a pathological process of a lamellar bone formation where it does not normally occur. HO mostly occurs on and around the hip joint. Shoulder and elbow are the other common-affected joints [1]. There are three well-known etiologies of HO as of traumatic, neurogenic, and genetic. Traumatic HO typically occurs after fractures, dislocations, operative procedures, and severe burns [2,3]. Usually, HO is seen around the hip, particularly after fracture and open reduction-internal fixation procedures or total hip arthroplasties. Neurogenic HO is seen after the central nervous system affecting situations such as spinal trauma and head injuries. Besides, HO can occur in some genetic disorders such as fibrodysplasia ossificans progressiva, and progressive osseous heteroplasia[1].

HO is typically seen after direct trauma to the muscle tissue, burns, femoral and acetabular fractures, and arthroplasty surgeries. However, it is rare in hemiplegic patients [4,5]. This report presents a case with HO developed on the left elbow 2 months after the stroke due to the hemorrhagic cerebrovascular event.

Case Report

A 71-year-old female patient applied to our outpatient clinic with left hemiplegia due to subarachnoid hemorrhage which had occurred 2 months ago. The patient had not seen rehabilitation before. Motor recovery in the left upper extremity was Brunnstrom stage 2, and in the left lower extremity was Brunnstrom stage 4. She could be mobilized with the support of two people. According to the modified Ashworth scale spasticity of the left wrist and finger flexors were grade 2. The left elbow's range of motion was painful, and the same elbow flexion was limited to 45 degrees in the physical examination. There was no redness and swelling on the elbow joint. Calcified heterotopic ossification (HO) was seen around the elbow joint at the anterior-posterior elbow radiography (Figure). Serum blood levels of the calcium, phosphate, sedimentation, and CRP were within the normal ranges. There was a mild elevation of alkaline phosphatase (ALP) level (165 IU/L). Indometazin was started for treatment of the HO. Also, the hemiplegic rehabilitation of the patient was mainly based on passive stretching exercises and ultrasound as a deep heating modality to the left elbow, instead of other exercises, balance and gait training. We continued the rehabilitation program for 5 weeks. After this program improvement of passive range of motion of the left elbow was achieved to 55 degrees. Motor recovery in the left upper extremity was Brunnstrom stage 2-3, and in the left lower extremity was Brunnstrom stage 5.

Discussion

Heterotopic ossification (HO) is thought to be the result of the inappropriate differentiation of pluripotent mesenchymal cells into osteoblastic stem cells. But the exact pathophysiological factors that cause HO remain unclear [6]. Local trauma probably disrupts the normal balance of bone formation and inhibition by inducing a cascade of inflammatory factors that ultimately promote the new lamellar bone formation. Also, similarly burns and



Figure. Heterotopic ossification around the left elbow joint

neurologic injury disrupts the balance between osteogenic and osteo-inhibitory factors [1].

HO typically occurs on the large joints such as hip, knee, shoulder, and elbow. Usually, it occurs on the paralysed extremity uni- or bilaterally under the injured neurological level. Immobilization, decubitus ulcers, trauma, carcinoma, burns, encephalitis, hematoma, and various neurological disorders (traumatic brain injury, traumatic spinal cord injury, stroke, poliomyelitis, meningitis, encephalitis, spinal cord tumors, syringomyelitis, and multiple sclerosis etc.) take place in the etiology. The incidence of the HO after traumatic brain injury, total hip replacement, burns and stroke were 11-76%, 16-53%, 1-3%, and 0.5-1.2%, respectively. [2,5]. HO occurs in the spastic extremities mostly. Late onset of rehabilitation after the stroke (such as our case), long-duration of immobilization, not applying of passive stretching exercises in this period, and presence of spasticity are the reasons thought to be the factors leading to HO occurrence. Although HO activity criteria are fewer, edema, high sedimentation rate, and ALP levels; gold-standard diagnosis methods are direct radiography and bone scintigraphy. Infection, deep venous thrombosis, septic arthritis, hemarthrosis, fractures, osteomyelitis, and early-stage decubitus ulcers take place in the differential diagnosis [7].

The treatment options of HO are preserving the affected joint's range of motion, pharmacological treatment (etidronate, non-steroid anti-inflammatory drugs), radiotherapy, and surgical excision of the mature bone tissue in the advanced cases. Prophylaxis is more important than treatment in this disease. Although biphosphonates particularly etidronates are stated to be beneficial at the prophylaxis and also early period treatment, their certain long-term effectiveness are not known [8]. Risk factors should be eliminated to prevent HO occurrence. In order

to minimize the possible complications; rehabilitation should be started as early as possible in patients with neurological impairment, passive range of motion exercises should be done in intensive care units during the acute phase, and exercises should be proposed as a post-discharge home program.

Conclusion

Heterotopic ossification (HO) is a condition that affects the patient's rehabilitation process, and therefore, the patient's mobility, self-care, and independence. In hemiplegic patients, especially in case of joint-related pain, local tenderness, heat in joint, swelling, and decreased range of motion HO should be considered in the differential diagnosis.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

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